

Ternary Compounds

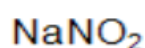
Ternary compounds are those containing three different elements. (NaNO₃, NH₄Cl, etc.). The naming of ternary compounds involves the memorization of several positive and negative polyatomic ions, (two or more atoms per ion), and adding these names to the element with which they combine.

Full name (roman numeral) + name of polyatomic ion

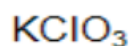
Binary rules for indicating the oxidation number of metals and for indicating the numbers of atoms present are followed. The polyatomic ions that should be learned are listed in a separate handout.



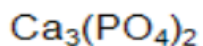
Ternary Compounds



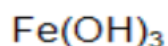
sodium nitrite



potassium chlorate



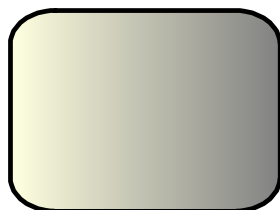
calcium phosphate



iron (III) hydroxide



sodium bicarbonate
'sodium hydrogen carbonate'







Common Polyatomic Ions

| Names of Common Polyatomic Ions | | | |
|---------------------------------|--|------------------------------------|--|
| Ion | Name | Ion | Name |
| NH_4^+ | ammonium | CO_3^{2-} | carbonate |
| NO_2^- | nitrite | HCO_3^- | hydrogen carbonate ("bicarbonate" is a widely used common name) |
| NO_3^- | nitrate | ClO^- | hypochlorite |
| SO_3^{2-} | sulfite | ClO_2^- | chlorite |
| SO_4^{2-} | sulfate | ClO_3^- | chlorate |
| HSO_4^- | hydrogen sulfate ("bisulfate" is a widely used common name) | ClO_4^- | perchlorate |
| OH^- | hydroxide | $\text{C}_2\text{H}_3\text{O}_2^-$ | acetate |
| CN^- | cyanide | MnO_4^- | permanganate |
| PO_4^{3-} | phosphate | $\text{Cr}_2\text{O}_7^{2-}$ | dichromate |
| HPO_4^{2-} | hydrogen phosphate | CrO_4^{2-} | chromate |
| H_2PO_4^- | dihydrogen phosphate | O_2^{2-} | peroxide |



ndahl, Zumdahl, DeCoste, *World of Chemistry*, 2000, page 100

Ternary Compounds

- $\text{Ca}_3(\text{PO}_4)_2$ calcium phosphate
- $(\text{NH}_4)_2\text{CO}_3$ ammonium carbonate
- $\text{Al}_2(\text{SO}_4)_3$ aluminum sulfate
- Na_2SO_4  sodium sulfate
- LiCN  lithium cyanide
- $\text{Ba}(\text{ClO}_3)_2$  barium chlorate
- $\text{Cu}(\text{OH})_2$  copper (II) hydroxide



Naming Chemical Compounds Acids, Bases, and Pure Ionic Salts NAME: _____ P. _____

| | Acids | Bases | Salts |
|----------------------|----------------------------|---|--|
| Binary | Hydrogen + <u>Nonmetal</u> | | Metal cation + <u>Nonmetal</u> |
| No Oxygen | | | full name ide ending |
| | | Metal + <u>Hydroxide</u> OH ⁻ | Metal + Negative Polyatomic Ion (usually containing Oxygen) |
| | | | PO ₄ ³⁻ Phosphate |
| | | | SO ₄ ²⁻ Sulfate |
| | | | CO ₃ ²⁻ Carbonate |
| | | | CrO ₄ ²⁻ Chromate |
| | | Ammonia NH ₃ (g) | NO ₃ ⁻ Nitrate |
| | | Ammonium NH ₄ ⁺ | ClO ₃ ⁻ Chlorate |
| | | | CH ₃ COO ⁻ Acetate (or ethanoate) or C ₂ H ₃ O ₂ ⁻ |
| Irregular Polyatomic | | ONE extra oxygen | per ate |
| "O" not normal | | ONE LESS oxygen | ite |
| | | TWO LESS oxygen | hypo ite |
| Properties | | | |
| | | | |

Regular Polyatomic "oxy"

Ammonium